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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,855	04/19/2006	Jan Jette Blange	TS6433US	5726

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EXAMINER	
DEBOER, JOHN M	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,855	BLANGE, JAN JETTE	
	Examiner	Art Unit	
	JOHN M. DEBOER	4112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) *7* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 April 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/26/2007, 04/19/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the elements:

a) "a supply channel" [connected to the abrasive supply inlet]

b) "angle" [between the flow direction in the supply channel and primary nozzle axis]

must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 2, 3, and 4 are objected to because of the following informalities:

a) lack of antecedent basis for the phrase "[nozzle unit of claim 1, wherein…] the length in flow direction…" Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "component" is not sufficiently described within the specification (see pg. 6, 20-25) for the examiner to understand what applicant means by the phrasing of claim 6. Elsewhere in the specification, applicant describes "fluid component" and "velocity component," but these were not helpful. The examiner

assumes that applicant means any directional component x, y, z of a known 3-D axis. Without adding new matter, applicant should clarify what is meant by the term or claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 3-4, 6, 8-9 and 11 rejected under 35 U.S.C. 102(b) as being anticipated by Hawthorne, et al., EP Application 0119338 A1 ("Hawthorne").

Claim 1 is an independent claim with the following limitations:

A nozzle unit for generating an abrasive jet, which nozzle unit comprises: a first nozzle connected to a pressurized carrier fluid supply, which first nozzle in a section thereof with its highest restriction defines a first nozzle opening having a cross sectional area A1 (Hawthorne, nozzle 9 has an aperture, inherently with a cross-sectional area, at its end; pg. 3, 23-26);

a mixing chamber in which the first nozzle discharges (mixing zone 10; see Fig. 1);

a second nozzle connected to the mixing chamber, which second nozzle in a section thereof with its highest restriction defines a second nozzle opening having a cross

sectional area A2 (outlet passageway 18, inherently has a second cross-sectional area [see abstract]);

and an abrasive particle inlet discharging in the mixing chamber; wherein the ratio A1/A2 is greater than or equal to 0.50 and lower than 1, wherein the first nozzle has an inside wall aligned with an inside wall of the mixing chamber (abrasive material comes from inlets 11 or 12 into the mixing zone 10 (see abstract); the ratio of the 2 nozzle areas can be between 0.5 and 1. For example, if the first nozzle 9 has a diameter of 3 mm, and the second diameter of outlet nozzle insert 17 is "somewhat greater" at 4 mm, this equates to a ratio of ~0.56 [see pg. 7, 10-15]. The first nozzle 9 has an inside wall aligned with an inside wall of the mixing zone 10 in that the faces of 9 and 10 are in line with each other, or when their center-lines lie on the same axis [see Fig. 1]).

Claim 3 depends upon rejected claim 1 with the additional limitation:
wherein the length in flow direction of the mixing chamber is in the range of 0.8-2.0 times the diameter of the first nozzle opening (Hawthorne, the diamter of nozzle 9 can be 4 mm, where 2.0 times the diameter is 8 mm. The length of mixing chamber is defined by wall 16 of nozzle insert 17, which can be 8 mm, because 8 mm is less than 250 mm [see pg. 7, 7-18]).

Claim 4 depends upon rejected claim 1 with the additional limitation:

wherein the length in flow direction of the second nozzle is in the range of 4-10 times the second nozzle diameter (Hawthorne, second nozzle diameter of passageway 18 can be 0.5-4 mm preferably; the length in flow direction of passageway 18 can be 2-40 mm, where the range is not more then 250 mm [see pg. 7, 7-18].

Claim 8 depends upon rejected claim 1 with the additional limitation:
[nozzle unit with] a supply channel connected to the abrasive supply inlet, wherein the supply channel surrounds the mixing chamber by an angle of less than 180 degrees (Hawthorne, Fig. 1 shows inlets 11 and 12 are around the mixing chamber covering a circumferential angle that is less than 180 deg. [see Figs. 3 & 5]).

For similar reasons, claim 9 is also rejected (Hawthorne, see Fig. 1, where the inlets 11 and 12 are configured approximately 30-45 degrees from axis of primary nozzle 9).

Examiner notes for method claims if a prior art device or apparatus, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered anticipated by the prior art device or apparatus. In this instance, examiner reasonably believes the method claim 11 pertains to the normal and usual operation of applicant's device in claims 1-10.

Claim 11 is an independent method claim with the following limitations:

A method of excavating a hole into an object, comprising the steps of: arranging into the hole an abrasive jet excavating tool comprising a nozzle unit, which nozzle unit comprises: a first nozzle connected to a pressurized carrier fluid supply, which first nozzle in a section thereof with its highest restriction defines a first nozzle opening having a cross sectional area A1 (Hawthorne, nozzle 9 has an aperture, inherently with a cross-sectional area, at its end; pg. 3, 23-26);

a mixing chamber in which the first nozzle discharges (mixing zone 10 [see Fig. 1]);

a second nozzle connected to the mixing chamber, which second nozzle in a section thereof with its highest restriction defines a second nozzle opening having a cross sectional area A2 (abrasive material comes from inlets 11 or 12 into the mixing zone 10 (see abstract); the ratio of the 2 nozzle areas can be between 0.5 and 1. For example, if the first nozzle 9 has a diameter of 3 mm, and the second diameter of outlet nozzle insert 17 is "somewhat greater" at 4 mm, this equates to a ratio of ~0.56 [see pg. 7, 10-15]. The first nozzle 9 has an inside wal aligned with an inside wall of the mixing zone 10 in that the faces of 9 and 10 are in line with each other, or when their center-lines lie on the same axis [see Fig. 1]);

and directing the abrasive jet into the object (pg. 1, 1-20).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawthorne as applied to claim 1 above, and further in view of Blange, PG Publication 2002/0079998 ("Blange").

Claim 2 depends upon rejected claim 1 with the additional limitation:

wherein the length in flow direction of the mixing chamber is such, that taking into account the divergence of the jet to be discharged from the first nozzle, the diameter of the jet leaving the mixing chamber is smaller than the diameter of the second nozzle opening (Blange, protrusion portion present in mixing chamber 12 [see Fig. 4]).

While Hawthorne teaches the elements of claim 1, it does not expressly disclose the diameter of a jet leaving the mixing chamber that is smaller than the diameter of a second nozzle opening. Instead, Blange teaches a mixing chamber 12 having a protrusion portion that makes the diameter smaller then that of the second nozzle opening (see Fig. 4). It would be obvious to a person of ordinary skill in the art at the time of the invention to modify the nozzle configuration of Hawthorne to have a second nozzle opening having a larger diameter then the diameter of the mixing chamber exit. It is desirous to have a portion of a nozzle where a first (or center) part has a smaller

diameter then a second (or end) part, which can be analogized as the effect from the diverging component of a standard venturi nozzle. The divergent portion of the venturi provides the ability to accelerate fluids to supersonic speeds, which provide for a greater thrust and higher exit velocity for a given mass flow of an abrasive particle spray.

Claim 10 depends upon rejected claim 1 with the following limitations:
a nozzle unit according to claim 1, and a separation device for separating magnetical or magnetizable abrasive particles from a fluid, which separation device comprises a magnet body for attracting the abrasive particles out of a fluid flowing along the separation device (Blange, claims 1, 8, 9),

and a support surface at least partially enveloping the magnet body (Blange, claims 1, 8, 9),

and means for transporting attracted abrasive particles along the support surface to the abrasive particle inlet of the nozzle unit (Blange, claims 1, 8, 9).

While Hawthorne teaches the limitations of claim 1, it does not disclose a configuration comprising a magnetic separation device. Instead, Blange teaches such a configuration. It would be obvious to a person of ordinary skill in the art at the time of the invention to use the magnetic separation device of Blange within the nozzle

configuration of Hawthorne. It is desirous to use such a configuration in an abrasive spray nozzle because the "drill string/pumping equipment is left substantially free from damage by the abrasive particles as these circulate through the lower part of the drill string only (see Blange, P[0031]." It is also desired to transport particles from a stream of fluid (see Blange, P[0001]).

10. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawthorne as applied to claim 1 above, and further in view of Woodson, US Patent 4,815,241 ("Woodson").
Claim 5 depends upon rejected claim 1 with the additional limitation:
wherein the second nozzle is eccentrically arranged relative to the first nozzle.

While Hawthorne teaches the limitations of claim 1, it does not expressly disclose an eccentric (not of the same center) arrangement of nozzles. Instead, Woodson teaches 2 nozzles having different centers. It would be obvious to a person of ordinary skill in the art at the time of the invention to configure the nozzles of Hawthorne in an eccentric manner. It is desirous to have a nozzle configuration where a second nozzle does not have the same center axis as a first nozzle because such a configuration is known to reduce internal erosion and wear to a minimum, thereby increasing the service life of the nozzle. Extended service live means less replacement costs, as well as less time replacing the nozzle (hence, subsequently fewer stoppages in operation).

Claim 6 depends upon claim 5 with the additional limitation:

wherein the eccentric displacement of the second nozzle has a component in the direction of the abrasive particle inlet (Hawthorne, see Figs. 4 & 5, with col. 6, 12-36, & col. 7, 1-6 describing the orientation of the sand inlets and passageway 18). For the reasons stated for claim 5, claim 6 is similarly rejected.

11. The prior art made of record and **not** relied upon but considered pertinent to applicant's disclosure:

1) Dale, et al., EP Application 0 526 087 A1

2) Blange, PG Publication 2006/0185907

3) Szucs, US Patent 5,462,605

4) Mutter, et al., US Patent 5,560,547

5) Shank, Jr., US Patent 5,857,900

6) Ulrich, et al., US Patent 6,752,685

7) Chung, et al., US Patent 6,691,928

The references mentioned above are deemed useful for background information as applicable to understanding applicant's invention (NOTE: not all sources may be prior art as per 102, nor would they be used for such a purpose).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN M. DEBOER whose telephone number is (571)270-3652. The examiner can normally be reached on M-Thur, alt. Friday (7:30 - 5:00 est).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bruce can be reached on 571-272-2487. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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